Abstract

Refugee populations migrate from one country to another, and experience nutrition transition associated with changes in their physical and social environments, diet, access to healthy foods and healthcare. Many Karen people of Burma have been resettled in the United States from Thailand refugee camps since 2005. The Karen traditionally come from rural areas dominated by subsistence farming in Burma, and many of them want to continue farming after they resettle in North Carolina. In 2014, two researchers at North Carolina State University developed a local project to: assess barriers and assets of the Karen; implement a community-led intervention using local food resources; and to evaluate the impact of project in order to contribute to best practices for adapting existing Cooperative Extension programs to better integrate these communities. Eight families participated in gardening project, and semi-structured interviews were conducted with six of the male participants. The interview guide was comprised of three sections: early food culture, immigration experience and changes to food availability, and participation in the community garden. Thematic qualitative analysis of the data revealed one major nutrition-related theme: good nutrition is obtained by consumption of "fresh" produce grown by Karen themselves. This suggests that increased access to land and associated gardening resources may lead to increase consumption of fresh fruits and vegetables by Karen community, reducing risk of chronic conditions associated with these refugees in the U.S. Increased access to land may have other cultural, agricultural, and economic benefits associated with gardening and fresh food production.

Introduction

Burma and the Karen

Burma (officially called Myanmar since 1989*) is the second largest geographic area in Southeast Asia bordered by China, Laos, Thailand, Bangladesh, India and the Bay of Bengal.[1] Burma's population is ethnically complex and composed of approximately 135 ethnic groups and sub-groups, each with its own dialect, beliefs and customs. The largest ethnic group in the country is the Burman people who comprise 68% of the country's population.[2] Burma has endured longstanding ethnic tensions between Burman majority and minority groups.[2] The Karen people are the third largest ethnic group, and comprise approximately 7% of Burma's population with 7 million people. The Karen are indigenous to the Thailand-Burma border region and live in the hilly eastern border region of Burma, primarily in Karen State, in Kayah State (Karenni State), southern Shan State (MoBye Region), Ayeyarwady Division (Irrawaddy Division), Southern Kawthoolei (Tenasserim Coastal Region) and in western Thailand[2] (See Appendix A1).

*The term "Karen" to refer to persons of Karen ethnicity who are from Burma; this includes the Sgaw (pronounced Skaw) Karen, Karenni, and Pa-o Karen. The term "Burmese" refers generally to persons born in Burma and to persons of Burman (or Burmese) ethnicity who are the majority ethnic group in Burma. Karen generally refer to the country from which they emigrated as "Burma;" because the Union of Myanmar represents a period of military dictatorship and political and economic hardship. Some Karen may be offended if they are referred to as Burmese, not only because of the political implications, but also because of different ethnic affiliations. [2]

Most Karen people are highly skilled subsistence farmers who live in small mountain villages growing rice, vegetables and livestock such as chickens, pigs and cows.[2] Rice is the main staple of the agrarian culture, as life follows a seasonal pattern of planting and harvesting rice. Economic activities of Karen communities are heavily reliant on farming, as nearly 70% of Karen participate in some form of agricultural production and/or hunting activities.[3] Other common crops include vegetables, corn, sesame and chilies. Karen knowledge of forest animals and plants is extensive and they eat wild foods, and plants in the forest. There are very few animals the Karen will not eat.[4]

Food plays a central role in Karen culture. A common Karen greeting is *Aw mee wee lee ar* – "Have you finished eating?"[4] A typical Karen dish consists of rice with a variety of vegetables and sometimes meat. Common vegetables include cucumbers, squash, bamboo shoots, eggplants, mushrooms from the forest and edible wild vegetables.[2] Fruits are grown only during the dry season and are not as common and plentiful as vegetables. Karen often eat curry dishes and add flavor to meals with chilies and spices such as turmeric, ginger, cardamom, garlic, tamarind, and lime juice.[2] Depending on geographical location in the country, fishing may be an option. A very famous dish among the Karen known as "nya u" or fish paste: a strong-tasting dish of fermented fish pounded into a paste that is usually served with rice and vegetables to add flavor.[2]

History and Conflict

Burma was colonized by the British between 1824 and 1885. For Burma's ethnic minority groups, colonization by the British meant liberation from oppressive rule. For the Burman majority, destruction of the monarchy meant loss of national pride.[4] After World War II the British granted independence to Burma in 1948.[5] Ethnic minority groups expected that in an independent Burma all ethnic groups would be equal, as they had been under the British.[4] However, Burman majority leaders expected that once the British had gone they would become the dominant ethnic group once again. Burman militias began to massacre Karen villagers, which led to the Karen "revolution" or insurgency on January 31, 1949.[4,5] Civil war broke out, and in 1962 military rule began, with constant fighting between the military government and various factions.[6] Since Burma's civil war began in 1949, displaced civilians have fled "liberated zones" along the Thai-Burma border and into Thailand. These tensions have shaped government, history and the geopolitical climate of the modern day. [1] In 2004, a ceasefire between the Karen and the Burmese government was brokered, but human rights abuses continue, including forced labor, village burnings, arbitrary taxation, rape, and extrajudicial killings.[6] Burma's military dominates its people, despite successive civilian led protests.

Refugee Camps

There are approximately 7 million Karen living in southeast Burma and approximately 400,000 living in Thailand.[7] About 120,000 currently live in nine government-run refugee camps in western Thailand, along the Burma border.[1,7] The camps are overseen and run by the Thailand Burma Border Consortium (TBC), a union of 10 international non-governmental organizations that provide food, shelter and non-food items to refugees and displaced people from Burma.[8] TBC remains the only agency responsible for providing food and shelter assistance to refugees. Refugees in the camps

are completely dependent on outside help for food, shelter, protection and other basic needs.[9] This dependency along with travel and work restrictions have adverse physical, psychological, and social effects on the refugees due to decreased food availability and their inability to be self-sufficient.[9] Recent funding cuts have caused food rations to fall substantially below minimum daily nutritional levels and forced TBC to cease the provision of all non-food items.[9] Health and education services for the refugees have also been cut back. Even with limited funding, TBC does have several successful projects such as the Community Agriculture Program (CAP) that is currently implemented in all nine camps.[9,10] CAP activities increase the availability of fresh food in camps, by using a farmer field school and cluster groups approach to gardening. The refugees plan and establish community gardens, kitchen gardens, and livestock-raising projects by coaching and learning from each other.[10] In addition to increasing food security and nutrition within the camps, these activities contribute to self-reliance and strengthen family and community livelihood capacities by preparing refugees with vital skills.[9,10] As a result of CAP activities, hundreds of households in the camps cultivate their own gardens. Projects such as CAP are essential for the refugees to regain confidence, motivation, and a sense of independence from TBC.[9]

Food, Health and Nutrition

Karen refugees have complex medical needs and are vulnerable to poor health for multiple reasons. In Burma, they may endure constant conflict and human rights violations, poor living conditions and disruption of health services; while in-transit, different patterns of communicable diseases, and issues associated with settlement and accessing services in a new country.[11] Refugees face a wide variety of acute or chronic health issues: infectious diseases such as tuberculosis, malaria and intestinal parasites, malnutrition especially micronutrient deficiencies, psychological disorders such as post-traumatic stress, injuries, under-immunization in children and under-managed chronic conditions such as hypertension, diabetes and chronic pain.[12] Microcytic anemia is a commonly encountered problem among recently arrived Southeast Asian immigrants.[2] Although some basic health care is provided in the camps, diseases such as malaria, dengue fever and tuberculosis are still common among refugees upon arrival to new countries.[9]

Malnutrition-related illness is a huge health concern during pre-migration period and transition to refugee camps. According to the most recent estimates Multiple Indicator Cluster Survey (MICS3, 2009/10) Burma's prevalence of underweight is 22.6%, stunting 35.1% and wasting 9.4% as per the new WHO growth standards.[13] These undernourished children have an increased risk of mortality, illness and infections, delayed development, cognitive deficits, poorer school performance, and fewer years in school.[14] In Thai refugee camps, the border-wide average chronic (stunting) malnutrition rate is classified as "very high", with camps with the highest stunting rates being located in the most remote areas of the border.[9] A diet composed mostly of rice, salt, chilies, and some vegetables contributes to a lack of protein and micronutrient deficiencies. Thiamine/Vitamin B1 deficiency (Beriberi) is commonly seen in pregnant women, post-partum lactating women, and young children in Karen villages.[14] Thiamine deficiency can cause congestive heart failure in infants and children, and according to a

cause-specific under-5 mortality survey, infantile Beriberi is the 5th leading cause of deaths among children between 1-12 months in Burma.[2,13] Vitamin A deficiency is an important factor contributing to blindness and respiratory infections.[2] Overall, adequate nutrient intake requires both sufficient quantity and quality of nutrients consumed. The high prevalence of certain micronutrient deficiencies indicates that the *quality* of many Karen diets may be insufficient, lacking adequate diversity to ensure the necessary consumption of foods rich in essential micronutrients.[12]

Many Karen refugees have recently resettled in the United States from these camps. All refugees are provided overseas screenings for pre-departure and then domestic medical screening usually conducted 30-90 days post-arrival in the United States.[15] These screenings such as HIV, tuberculosis, STI's, immunizations, and malaria, and intestinal parasite help to identify, treat and prevent morbidity and mortality from preventable diseases. However, the process of migration and adaptation to a new lifestyle in the United States generally predisposes refugees to disorders, such as hyperlipidemia and cardiovascular diseases, which are not common in refugee populations on arrival.[15] Prevention and monitoring of lifestyle habits once they are resettled will be essential to refugee maintenance of health while in the U.S.

Karen Refugees in the U.S.

Refugees from Burma began settling in the U.S. around 2005, and represented 23 percent of the total number of refugees admitted and 30 percent of the total in 2011.[3] From 2002–2011, immigrants from Burma were the largest refugee group resettling in the U.S. with 88,348, or 17 percent of the total refugees. They made up the second-largest group in 2009 and 2010, and the largest group in 2011.[3] According to the U.S. Office of Refugee Resettlement, more than 14,000 refugees have been resettled in North Carolina in the past decade, constituting 40% of all refugees in NC.[17]

Populations that migrate from one country to another undergo a consequent nutrition transition associated with changes in their physical and social environments, diet, physical activity, and access to healthcare.[16] As they adapt to a different food environment, many struggle to be well nourished. Refugee populations are particularly vulnerable as they face settlement difficulties associated with access to appropriate healthcare, language difficulties, financial difficulties as a result of unemployment, and cultural differences.[16] Factors such as low income, poor accessibility to healthy foods, and changes in food choices are a common cause of poor health among migrants.[16] Many refugees come from countries where farming is the economic backbone of their communities, providing access to fresh, healthy foods. Their farming experience is rooted in cultural tradition and identity and may serve as a pathway to engage these communities; yet, refugees resettling in the U.S. are generally underserved by agricultural and/or health promotion interventions. Refugee populations establish early social connections within their own ethnic communities, but they often have limited meaningful social connectedness beyond these communities; therefore a range of cultural and social barriers can complicate engagement with the community.[17] Some organizations such as Transplanting Traditions have emerged in North Carolina to provide access to agricultural and entrepreneurial opportunities for Karen refugees through community-support agriculture.[18] The development of effective lifestyle and

health interventions for refugee populations is vital to influencing their food choices and nutrition, but can be a major challenge.

Methods

Community Garden Intervention

Many Karen refugees come from rural areas where they had been subsistence farmers in their home country. Because they had been used to growing their own food, they want to continue to grow it after they resettle in North Carolina.[18] In the past decade community food gardens have increasingly been implemented as a local, urban intervention to improve access to low cost nutritious food, physical activity and community networks.[16] Many initiatives, such as Refugee Agricultural Partnership Program (RAPP) promote the idea that healthy foods and good nutrition for refugee families are fundamental to the resettlement process. Refugee families are mostly resettled in "food deserts," low-income areas without easy access to fresh and healthy produce.[19] Current research suggests that community gardens tend to include marginalized populations such as refugees in social endeavors where they can acquire skills, access nutritious and culturally relevant food and enjoy the physical and psychosocial benefits of tilling the earth.[17] Community gardens are also well documented for their ability to positively affect food choice by enhancing knowledge and self-efficacy in relation to production and preparation of vegetables and fruits.[17] Although a variety of initiatives have relied on using local food to increase access to healthy and affordable foods, immigrant and refugee populations are often socially isolated from organizations that provide services to address health issues through connections with local food.[16]

Intervention Description[16]:

In 2014, Dr. J. Dara Bloom and Dr. Annie Hardison-Moody at North Carolina State University began working with three Immigrant and Refugee communities in local suburban area. This project was developed to establish and strengthen partnerships with these communities with the ultimate goal of adapting existing Cooperative Extension programs and delivery methods to meet the specific needs of immigrant and refugee populations. Different from many other initiatives, this intervention is designed to study each diverse population's interactions with food environment in order to see how local food systems can increase access to healthy and affordable foods for low-income consumers. The researchers' plan was to conduct initial community interest meeting to assess needs; provide resources for community-led gardening project; and offer nutrition education resources.

One of the 3 communities selected was the Karen refugees, most of who were resettled in North Carolina between 2008-2013. The Karen are a community in the county have traditional farming and cooking skills that could be drawn upon to support their food security needs.[16] Using a nonprofit organization in a neighboring county that was already working with a Karen refugee population, the Karen intervention participants were recruited by reaching out to church congregations in the local community. The researchers conducted community interest meetings regarding local food systems, food access, and nutrition needs of this community. The Karen requested arable land for gardening to plant fresh produce for their families.

The goals of the intervention were to[16]:

- Determine assets and barriers that communities face in terms of access to local food.
- To enhance immigrant communities' ability to access resources that address health disparities and improve connections with local sources of health foods.
- Ultimately, to contribute to understanding of best practices for improving the wellbeing of immigrant community by integrating them with Cooperative Extension programs to address health though support for local food production and preparation.

Data Analysis and Collection

To evaluate the intervention, I was tasked with creating an interview guide that address participation in garden project, as well as collect information on food culture and history. Dr. Bloom, Dr. Hardison-Moody, Dr. Michael Schulman and I met to discuss the structure, format, and prioritize the content of the interview question guide. After meeting and two subsequent drafts, the interview guide was approved for two practice interviews. For interview training purpose and to test the comprehensibility of the questions, two practice interviews were conducted with Dr. Hardison-Moody and Dr. Bloom as lead interviewers while I shadowed. One interview was conducted with the Karen language interpreter who also participated in gardening intervention, and the other was with the community liaison for one of the other groups that participated in a garden-based intervention. As a result of the practice interviews, some adjustments were made to the interview guides: a set of additional questions were developed to tailor to each participating community group; some questions were reformatted, added and/or eliminated; and many questions were rephrased for simplicity and clarity.

The interview guide was comprised of three sections: early food culture, immigration experience and changes to food availability, and participation in the community garden. The final interview guide was designed to be conversational. Questions were open ended, to encourage participants to share their past and present gardening experiences (See Appendix A2). From October to November 2015, in-person interviews were conducted with 6 individual male Karen garden intervention participants. Dr. Bloom completed the first interview as mentioned above. The second interview was conducted with Dr. Bloom and myself as primary and secondary interviewers respectively. I conducted the remaining 4 interviews as primary and sole interviewer. Interviews took place in familiar and comfortable location for the participants. One interview was conducted on a porch outside of pizza shop, one in the participant's home, and the others were on-site at the Karen community garden. We used a Karen S'ghaw language interpreter for 4 of the 6 interviews, and each was recorded and transcribed verbatim. Two interviews did not require interpretation. Interviews commenced with introduction to purposes of our research, informed consent, then progressed through the three sections interview protocol. This interview was designed to be 45 minutes to one hour in length.

After each interview, I wrote field notes that were discussed in weekly meetings with Dr. Bloom and Dr. Hardison-Moody. We analyzed the research process, and important thematic concepts were developed. For purposes of this paper, I completed a separate thematic analysis of the transcripts by identifying and grouping key words or

phrases throughout the transcribed interviews and my interview notes. These field note discussions together with a copy of my first qualitative analysis data were then combined to conduct a second, more specific round of thematic analysis. Once completed, the main theme was identified.

Results and Analysis

Eight families were reported to have consistently participated in the planting and harvest of fresh produce on the provided land in summer of 2015. Most of the participants came to the garden average of twice per week early in the morning. They were able to grow water gourd, chili peppers, eggplant, tomatoes, peppers, multiple families of cabbage, squash, cucumbers, and other vegetables. Each of the families was each given a few rows to plant what they wished for their own consumption. They were able to maximize the plot of land given to them by the nonprofit partner. The group also opted not to have nutrition classes. At the end of the summer gardening session, the Karen asked to continue gardening on the land, expanding their plot of land for next year.

The thematic analysis of the data from the participant interviews revealed one major nutrition-related theme: For the participants, good nutrition is obtained by consumption of fresh produce grown by Karen themselves. The concept of "fresh" is determined by knowledge that plant-based produce is grown and processed absent of fertilizer, pesticides, preservatives and/or other chemical additives. This knowledge cannot truly be obtained without planting, caring for, and harvesting the produce themselves. Fresh fruits and vegetables contain more nutrition to maintain health.

When asked what motivated each participant to work in the garden?

> *I wanted to have a vegetable—eat vegetable without using chemical or other insecticide or fertilizer. That is the main thing. Fresh. And good for nutrition.* (Karen 2, married, middle-aged)

> *I felt more comfortable now because the fruits or vegetables that I grew here is coming out of my own hand so I know exactly there is no chemical in it so I felt more sure. One person said that. It would give me best good nutrition not like the one I'm going to buy at the service center. I don't know what people put. So I feel more comfortable to eat my own vegetables than buy it at the store.* (Karen 2)

> *...we prefer to eat vegetables that we were in the plant our own from the garden directly. It tastes much better that is organic you know we don't use seldom buy food from the shopping center in the Thai.* (Karen 1, married, middle-aged)

> *First I want to participate in this garden is first I wanted to grow my you know—vegetables or plants from my country and secondly eat a thing I grew vegetables here* (Karen 5, married, middle-aged)

Explicitly stated in each of these responses is the preference for fresh produce,

but also the concept of security being "more comfortable," feeling "more sure," by growing their own fruits and vegetables. This fresh produce came out the garden directly, "out of my own hand". The full implications of the Karen's use of "fresh" is closest to the American definition "organic," except "fresh" cannot be separated from *how* their produce is grown. While Americans may rely on food production companies to label produce "100% organic," "certified organic," or "USDA organic," the Karen rely on their hands-own work in gardens for reassurance that no unknown additives are used.

This is further evidenced by many responses when asked about access to fresh fruits and vegetables in refugee camps:

> *Yes, we have a chance to get the fresh food but I'm not sure whether fresh or not because we don't where they—how did they plant it? They used compost or fertilizer, I don't know. We have a chance to get it but it looks not fresh.* (Karen 4, married, older adult)

> *Yes, we bought fruit and vegetables in the market but its look fresh but I'm not sure whether it's really fresh because we don't know how people grew it. We bought it from the market. The Thai people—the Thai farmer* (Karen 5)

Even when purchasing vegetables from Thai farmers at market (similar to an American Farmer's Market), they were unsure of its "freshness". The Thai farmers and market vendors were not a trusted source of proper farming and gardening because their methods were unknown. A typical American experience of obtaining fresh produce is in "fresh" section of the grocery store, seeing it as the healthiest option as compared to frozen and canned fruits and vegetables. For the Karen, fruits and vegetables from the grocery store or farmers market still does not meet optimal produce quality standards. While they do purchase produce from the store, 'fresh' is not the term they use to describe these purchases. They may ask: *What farm did it come from? How did they plant it? What did they use?*

For the Karen, food is closely tied to health. According to a traditional saying, "Food is medicine and medicine is food."[21] But the concept of nutrition is associated with immigrating to the U.S. and when it is mentioned in the interviews, their ideas of food, nutrition and health are tightly intertwined:

> *In Burma or in the front line or at refugee camp we don't know about much about nutrition our body need. So that very different so we eat whatever we wanted to eat. We eat, for example, Karen people used to eat a bowl a big bowl of rice with fish paste only that is for the breakfast, and in the evening continue to eat that paste. But we don't know that is carbohydrates...there is no minerals in it, there is no any other mineral or any other things that nutrition that your body need, but we don't know that. But while we are came here I learn about that I try to read a lot of books. I learn that we need to eat a balanced food balanced nutrition. Yeah there is a lot of that I learn here...* (Karen 1)

I used to be sick very often in Thailand in the camp. But when I came here maybe because of the diet—the nutrition from the food that I eat so I don't very often sick like I was there before. So maybe this is because of the better nutrition that I ate (Karen 2)

I wanted fresh, organic foods without chemicals, and to decrease my grocery bills, and to increase my health...Eating a variety of vegetables and fruits is good health. In Thailand, I ate rice everyday. (Karen 3, unmarried, young adult)

These quotes express a common experience that many interviewees mentioned as a part of their transition to the United States. Fresh, organic, farm-grown produce were the only option in Burma, and even in many of the refugee camps. Many did not have a concept of poor-quality fruits and vegetables because they *only* consumed organically grown vegetables. Good nutrition was not dictated by balance of protein, carbohydrates, and micronutrients; but rather a result of consuming quality and traditional foods to that have the nutrition in them, thus allowing maintenance of good health. Throughout the interviews, access to fresh produce is often described as having a "strip of land" or a garden or farm, rather than having produce itself. Thai-farmers and others may bring fruits and vegetables; however, there are no guarantees of quality, nutritious produce unless the Karen trusted the source and/or see how it was grown. When asked what improvement could be made for future programs, 4 of 6 responded increase in size of farm or number of rows given to each family. Having more space to grow, leads to having fresh and healthy produce, which contain more nutrients for better health.

The data reveal that increasing food access for the Karen is not limited to the availability of fresh produce in food outlets or access to grocery stores, but should include increasing access to arable land, and resources to harvest that land. This may lead to increased fruit and vegetable consumption among this refugee population, as well as other cultural, agricultural, and economic benefits associated with gardening and fresh food production.

Discussion

This intervention was able to build on immigrants' existing agricultural and food-related skills by partnering with local nonprofit to provide access to land that harvested local, fresh fruits and vegetables for the participating families. Assets of the Karen community include: cultural farming knowledge, motivation to garden/farm, and willingness to work and care for garden. Barriers to access for the Karen community include: not having land to plant produce, little knowledge of community resources available to help with gardening, and poor knowledge of how to garden in U.S. temperate climate. The intervention was able to provide land for Karen community, offer nutrition and gardening resources to increase farming knowledge and skills; therefore increasing local food production and involvement of previously vulnerable, isolated population. The interview questions also contributed to understanding of best practices on improving immigrant community including: need for alternatives to nutrition classes, using cultural history and motivation to promote participation in local food production and access, and finding gardening space close to homes of participants.

Strengths and Limitations

Given the limited existing information about Burmese refugees in the United States, it is important to obtain and analyze both quantitative and qualitative data. Semi structured interviews are a prominent and widely used data collection strategy in qualitative research[17], and well suited to the purpose and nature of the research being undertaken. Using open-ended interview questions allowed us to study the six participants in depth, and provide understanding of their personal experiences associated with food, nutrition and immigration to the U.S. This data was based on participants' own categories of meaning and allowed us to see their interpretation of "fresh," "nutrition" and other constructs. Also, in addition to achieving main goals of the intervention, there were other perceived benefits not discussed in this paper including: preserving culture of farming, gardening for social cohesiveness and promotion of mental health, and building for future farming business that will sell produce to American neighbors.

Limitations to this intervention include small, all male sample size, and use of an interpreter's translation for transcription of interviews. Only 8 families participated in the gardening project and only 6 male participants were interviewed. The male perspectives of working in the garden may not represent the experiences of their woman, young adult, or other family members who also worked in the garden. While we were able to collect more in-depth data from each interviewee, the knowledge produced from this small sample size may not be generalizable to other people or other settings. Our findings may be unique the people included in the research study.

Currently there is no accreditation for Karen interpreters.[4] We used Karen community leader and garden intervention participant, Karen 1, as our interpreter. Beneficially, the interviewees felt very comfortable with him; however, our audio recordings were transcribed verbatim based solely on Karen 1's translation of interviewees' responses and without resources to verify interpretation. While Karen 1 consistently asked for clarification for questions he did not understand, there may have been extra explanations of cultural context(s) for added comprehension. In Karen culture, self-expression promotes community values and cultural identity, and rarely individual opinions or needs.[5] Modesty is valued and many Karen will answer "No" asked direct questions about their individual needs.[3] The interview questions were designed to reflect individual experiences and opinions regarding the gardening intervention. Because of this, Karen 1 may have expanded upon some of the answers so that we understood the interviewees' answers. This may have affected accuracy of translating interviewee's ideas or thoughts.

Implications for Public Health and Conclusion

Studies of immigrant and refugee populations tend to focus on acculturation and dietary transitions when immigrating to America. [20-23] Over time, immigrants tend to assimilate and adopt American eating habits, food choices, and diet patterns the longer they stay in the U. S.[20-23] This increased consumption of fast food and convenience foods, larger portion sizes, and sedentary behaviors and is known as the "healthy migrant paradox"[15,20,21]. Our participants have been in the U.S. between 2-7 years and many report eating the same diet as they did in Burma and in the Thai refugee camps.

Some were able to grow vegetables inside the refugee camps to complement the monthly rations distributed by NGOs. Since resettlement, our interviewees reported purchasing the same foods from specialty stores and eating the same pre-immigration meals of rice, vegetables, and fish paste, and spices. This intervention showed that the Karen emphasis on growing their own food in the U.S. is not simply about access to food, and/or money to purchase food items; but about access to land and gardening tools that allow self-led planting and harvesting of "fresh," nutritious produce. Most of our interviewees expressed a dislike for taste and/or quality of American foods, a deep fondness and preference for Karen-style foods, and pride in the preservation of their pre-immigration dietary habits and cultural food choices. For these Karen refugees, health and nutrition are conditions of access to their "fresh" foods, not a shift in dietary pattern that is most often to focus of nutrition research regarding refugee and immigrant populations. Acculturation and adoption of western dietary habits cannot fully explain new dietary patterns among immigrant and refugee communities. Our intervention participants show that diet may change in such a way that it elaborates on specific ethnic traditions, and simply incorporate some Western food habits. For public health interventions targeting refugee populations, it is important to understanding linguistic and cultural concepts of food, nutrition, and health to facilitate transition to a new country. Access to familiar and healthy foods, especially through gardening, may be critical to their overall health.

A diet high in fruits and vegetables is associated with a decreased risk of many chronic diseases, including heart disease, hypertension, diabetes, and some cancers[24] The local food movement in the United States has evolved over the past 25 years with many initiatives that use sustainable and organic farming practice to promote accessibility and availability of healthy foods to all people[25]. Karen refugees resettled in the U.S. are at increased risk for chronic disease due to their migratory experiences, limited community resources to help with transition, and poorer access to healthy foods, nutrition education, and healthcare. To help prevent nutrition-related chronic diseases, local community initiatives and interventions need culturally relevant information to establish connections with these refugee populations. RAPP suggests that local organizations could be most effective in promoting the supply of quality of food through refugee farming.[19] They can adapt to challenges and opportunities of their individual communities, and form multiple partnerships with private and public organizations to support agriculture initiatives. Refugees, as potential producers of healthier foods can make a big impact in their own families and communities by growing fresh fruits and vegetables, and strengthening their own health and well being.[19]

Increased access to land for gardening may lead to increase consumption of fresh fruits and vegetables by Karen community, which may help reduce risk of chronic conditions associated with these refugees such as hypertension, type 2 diabetes, and obesity. Improving balanced diets can be delicate from a cultural perspective. Although local supplies of some foods may be sufficient, traditional food habits and practices play a crucial role in inadequate food and nutrient consumption, and need to be addressed by improving knowledge on nutrition.[12] This intervention sheds light on the constructs of nutrition, food, and health in this sample of North Carolina Karen refugees. It also accomplished the goal of connecting a usually marginalized population with community

resources to improve access to local foods. Development of effective health and education resources, as well as food access interventions should be tailored in such a way that their cultures are respected. For the Karen, the ability to return to their homes in Burma in the future is unknown, so they must build their lives here. "The first generation plants the seeds, the second generation gets the shade, the third generation gets the fruit."

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Appendix

A1. Maps of Burma

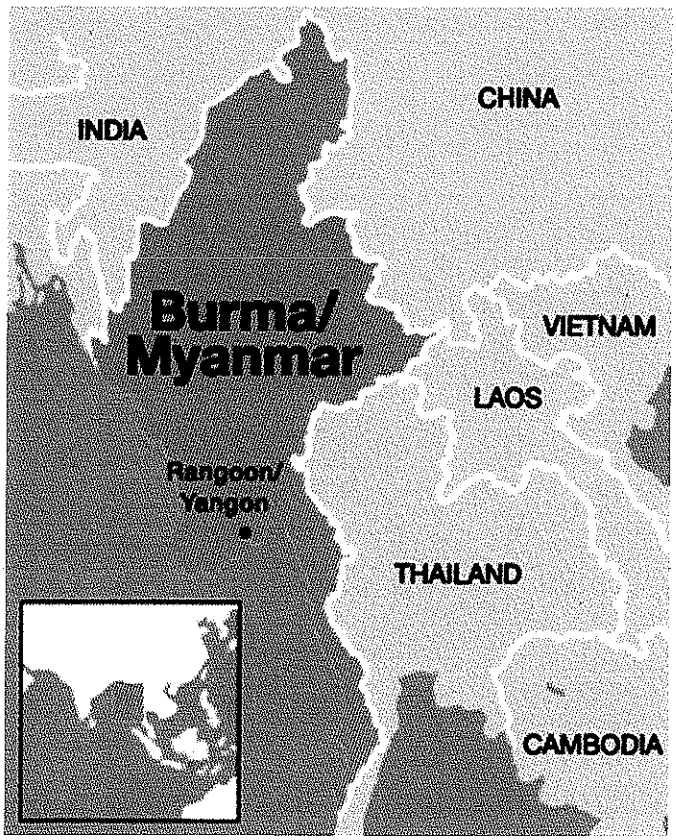

Image: http://partnews.brownbag.me/2013/04/03/is-it-burma-or-myanmar/

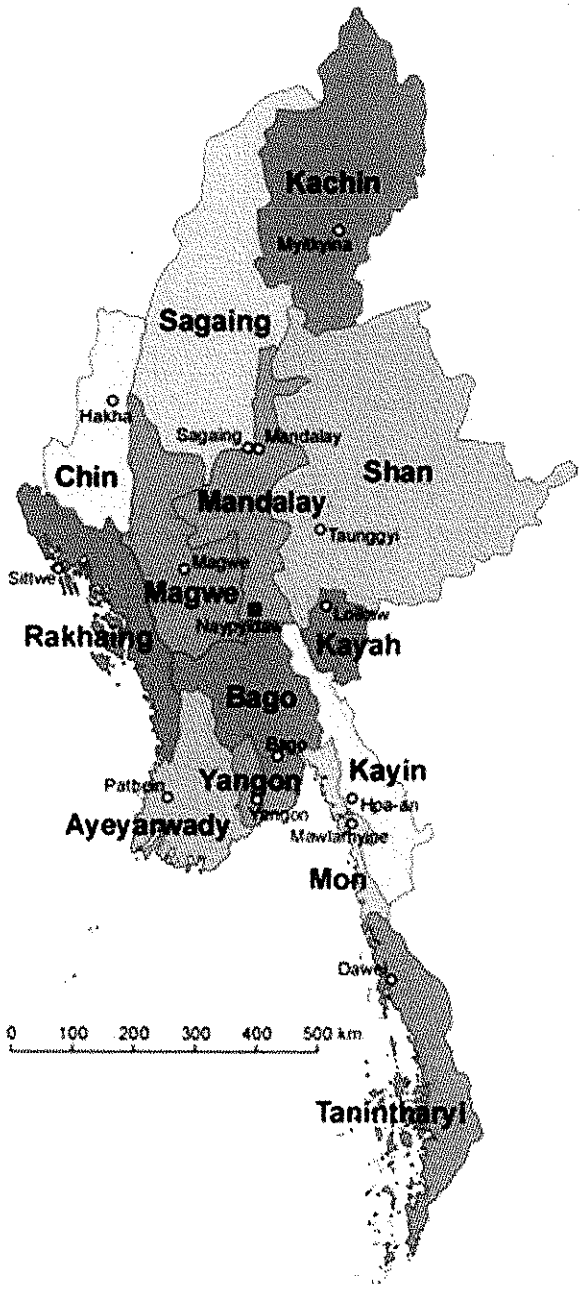

Image: http://5starmyanmar.com/Myanmar-Burma-Maps.htm

A2. Immigrant and Gardening Project Interview Guide

For the interviewee: In this interview, we hope to learn more about your lifetime experiences with food, gardening, changes to dietary pattern and food choices associated with immigrating to the United States. We also hope to discuss your participation in the gardening project. This interview is designed to be approximately 45 minutes in length. However, feel free to expand on the topic or talk about related ideas. If you do not feel comfortable answering a question, please say so, and we will move on to the next question.

For the interviewer: Be sure to ask all bolded questions directly. Take notes for the responses to open ended questions.

INTERVIEW QUESTIONS—Karen Community Group

1. **Where were you born?**

2. **Tell me about your family and the place you grew up.**

3. **Do you have children? If yes, Where were they born?**

Early Food culture:

4. **Could you tell me about a typical meal in your home country?**
    a. **Where and how were meals served and eaten?**
    b. **What were some common beverages?**

5. **Did your family grow food? I.e. garden or farm? If YES,**
    a. **How big was the garden/farm?**
    b. **What did your family grow/raise?**
    c. **What did you do with the produce?**
        i. Prepare/cook it for self/family?
        ii. Give it away?
        iii. Sell it? To whom and where?

6. **Where did you/your family get your food and/or groceries?** (Such as Eggs, milk, cheese
7. How did you store and/or preserve food?

8. **What is one dish from your home country that you would like Americans to taste?**

9. REFUGEE camp. (If mentioned by interviewee and/or not described in detail) **Tell me about the food at the refugee camp(s).**
    a. **Did you have access to fresh produce?**

Immigration:

Tell me about your arrival to the United States. What were the greatest changes you experienced related to food and diet once you were here?

10. When did you come to the U.S.?

11. What were some of the first differences you noticed in food practices? (I.e. types of available food, food prices, cooking methods, etc.)

Current Food Choices:

Now that you're settled in North Carolina, tell me some of the major differences in foods you eat, food access, gardening, etc.

12. What is a typical meal in your home now?
    a. How are meals served and eaten?
    b. What are common beverages?

13. Where do you get groceries now? How do you store/preserve your food?

14. Overall, how has your diet changed since moving to the U.S.?
    a. Which changes do you think have been good?
    b. Which have been bad?

15. What is your idea of a "healthy" meal here in the U.S.? Is that different from your home country?

16. Do your children eat differently than you or prefer different foods?

17. Are there any foods that are hard to find here, that are popular/commonly found in your home country?
    a. Have you found somewhere to obtain/purchase these items?

Gardening Project : Now I'd like to discuss your experience with the community garden/garden project.

1. **What motivated you to become involved in the community garden project?**
    a. How long have you worked in the community garden?
    b. How much time do you spend in the community garden per week?

2. **What was/were your goal(s)for participating OR What did you hope to accomplish by participating in community garden project?**

3. **Did you have any concerns going in to work in the community garden?**

If yes, tell me a little about those concerns.

4. **How is this garden different from other gardens you have worked in before/seen?**

5. **Is there anything you know how to do now that you didn't know before participating in the garden?**
    a. Did you learn more about gardening (seasonality, soil inputs) in the U.S.?

6. **What did you do with the produce from this garden project?**

7. **Has your consumption of fruits and vegetables changed since your participation in the community garden project?**

8. **Have your purchases at food stores changed since your participation in gardening project?**

9. **What recommendation would you give the administrators on improving the community garden experience for future participants?**

10. **Besides gardening, do you participate in other exercise or physical activity such as playing sports, dancing, walking, running, jogging, swimming, etc.? If yes, What type and how often?**

11. **Is there anything that I missed in the interview that you would like to add regarding your experience with the community garden?**